Castilleja

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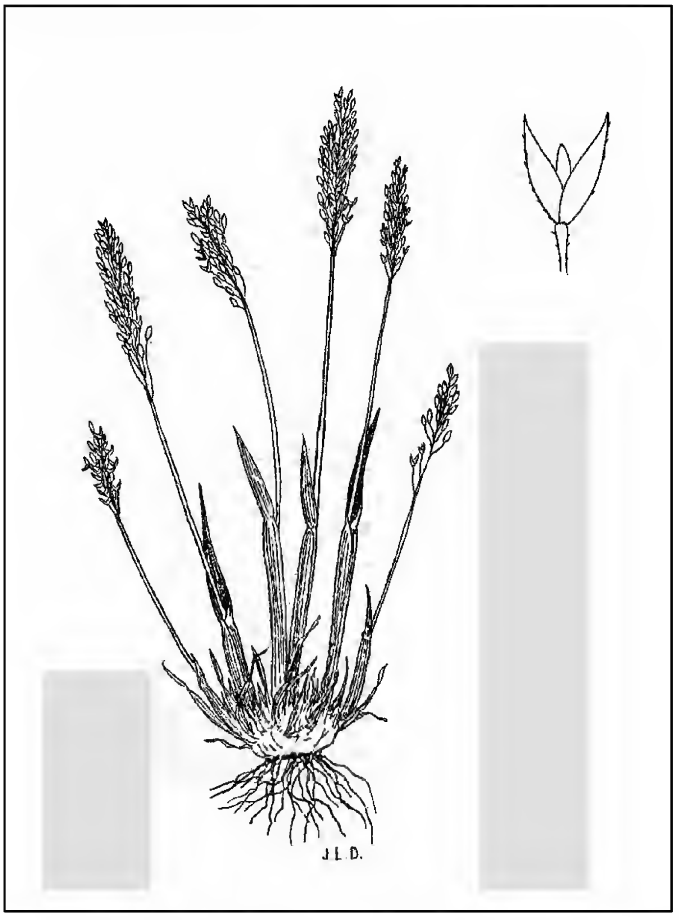
Some Like It HOT...

(*Editor's note: The following is taken from a recent publication in Ecology; Tercek and Whitbeck 2004*).

Two *Agrostis* (bentgrass) taxa occur in geothermal habitats of Yellowstone National Park: *Agrostis rossiae* is reported to be endemic to the thermal areas and *A. scabra* occurs in both thermal and nonthermal habitats. Thermal populations of both taxa are always surrounded by a nontherrnal population of *A. scabra* that is reproductively isolated from the thermal plants by its later flowering time (summer rather than spring). Since *Agrostis* species are known for their ability to form edaphic ecotypes, we used common garden and greenhouse experiments to test the hypothesis that soil conditions were responsible for the separation of thermal and nonthermal populations. In addition, field monitoring and growth chamber experiments were used to determine whether soil temperature affected the local distribution

The results indicate that the separate distribution of the thermal and nonthermal taxa is due to interaction between (*Continue on p. 2*)



Above: *Agrostis rossiae* (Ross' bentgrass) is a denizen of Yellowstone National Park thermal areas. Illustration by Jane Dorn

The news that *Agrostis rossiae* is no longer a state endemic would not cause a stir if it was "caught" across the border in Idaho. But Wyoming may have to share this former state endemic with Kamtchatka (the eastern Russian peninsula) as suggested by genetics research using RAPD techniques (Tercek et al. 2003). Further taxonomic research is pending and nomenclature is under review. Clearly, plant taxonomy is a hot topic.

WNPS NEWS

By-Laws Vote

This annual renewal and election ballot issue includes a vote on the WNPS By-Laws. Proposed amendments would create a life membership category and would place the WNPS membership year, Board term of office, and fiscal year in line with one another. They would also enable members to amend the By-Laws by mail!

Reminder

The 2005 scholarship deadline is January 28, 2005; submitted to WNPS at the mailing address listed on this page. *We are proud to run articles by two of the distinguished scholarship recipients of past years in this issue (Tercek, Snow).*

Wyoming Native Plant Society
P.O. Box 2500, Laramie, WY 82073

WNPS Board - 2004
President: Jean Daly (Big Horn) 674-9728
Vice President: Melanie Arnett (Laramie) 742-0988
Sec.-Treasurer: Drew Arnold (Laramie) 742-7079
Board Members: Kent Houston (Cody) 527-6572
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* * * * * * * *

Newsletter Editor: Bonnie Heidel (Laramie; email: bheidel@uwyo.edu)
Teton Chapter: PO Box 82, Wilson, WY 83014 (Joan Lucas, Treasurer)
Bighorn Native Plant Society: PO Box 21, Big Horn, WY 82833 (Jean Daly, Treasurer)
Webmaster-Tessa Dutcher (tessad@uwyo.edu)

Contributers to this issue include: Jane Dorn, Robert Dorn, Joy Handley, Bonnie Heidel, George Jones, Hollis Marriott, Neil Snow and Mike Tercek.

Treasurer's Report: Balance as of 4 November 2004: General Fund $662.66; Student Scholarship Fund: $187.00; Total funds $849.66

New Members: Please welcome the following new members and subscribers to WNPS: Alex Buerkle & Amy Krist, Laramie; Michael Tercek, Bozeman, MT.

The next newsletter deadline is 18 Feb 2005.
Please return the 2005 ballot, By-Laws vote, and field survey, plus renewal if due, by 4 February!

Some like it Hot... *Continued from p. 1*

temperature and the life history of the thermal and nonthermal plants. Nonthermal *Agrostis* plants are perennial and excluded from the thermal habitats by lethal summer soil temperatures that limit the duration of the growing season, effectively selecting for precocious flowering and annual habit. The thermal plants, in contrast, do not grow in the nonthermal matrix with prevailing cool field temperatures, but do grow in these habitats under artificially elevated temperatures. The thermal taxa may have reduced competitive ability at cooler temperatures. Thermal *Agrostis* have adopted a "stress avoidance" strategy, unlike previously studied thermal plants in Yellowstone, e.g., *Dichanthelium lanuginosum*, which are stress tolerant. Some like it hot... and others are merely in ecological avoidance.

Acknowledgements The author expresses special thanks to Jennifer Whipple, Yellowstone National Park Botanist.

References cited

Tercek, M.T., D.P. Hauber, and S.P Darwin. 2003. Genetic and historical relationships among geothermally adapted *Agrostis* (Bentgrass) of North America and Kamchatka: evidence for a previously unrecognized thermally adapted taxon. American Journal of Botany 90:1306-1312.

Tercek, M.T. and J.L. Whitbeck. 2004. Heat avoidance life history strategy controls the distribution of geothermal *Agrostis* in Yellowstone. Ecology 85(7):1955-1966.

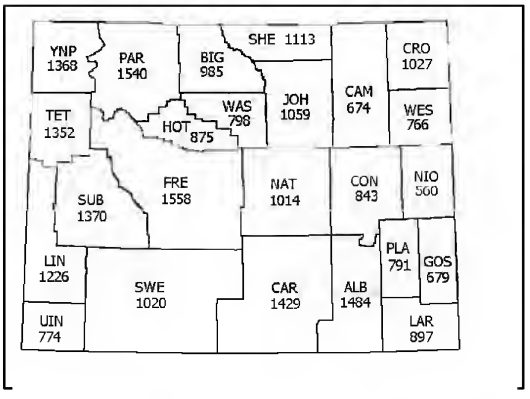
Floristic Diversity Followup

by Robert Dorn

In the previous issue of *Castilleja*, Walt Fertig provided the number of known vascular plant taxa for each county in Wyoming and commented on possible reasons for the differences. We can evaluate some reasons quantitatively using correlation coefficients which tell us how well two sets of data are correlated. An example of two data sets would be number of taxa in each county for one set and area of each county for the other set. Correlations normally range from 0 (no correlation) to 1 (complete correlation). We must make some assumptions concerning the plants: (1) each county is reasonably well collected, (2) latitude and longitude are not important, and (3) precipitation and substrate differences are not important. The accompanying table lists the basic data for the 23 counties plus Yellowstone National Park. The areas for Park and Teton counties are estimates to exclude the portion within Yellowstone Park.

The number of taxa in each county is compared to county parameters (Table 1) to yield the correlation coefficients listed below.

?	Highest Elevation	.79
?	Area x Elevational Range	.75
?	Area x Highest Elevation	.70
?	Elevational Range	.68
?	Area	.49



Tallies of vascular plant species and varieties per county in Wyoming are shown in t he map above, compiled by Walter Fertig (Castilleja 23:3). *Errata: The original map included a caption but credits were omitted. They are reprinted below:*

"Numbers are derived primarily from Dorn 2001 (Vascular Plants of Wyoming, 3rd edition) and additional county records for Teton County (Stuart Markow), Lincoln County (Clay Kyte & Walter Fertig) and Yellowstone NP (Jennifer Whipple) and statewide from Bonnie Heidel and others."

Table 1. County Floristic Data and Parameters

County	# Taxa	Highest Elev (ft)	Area (sq mi)	Elev (ft) Range
Fremont	1558	13800	9264	9100
Park	1540	13100	5102	9000
Albany	1484	12000	4305	6400
Carbon	1429	12000	7962	6200
Sublette	1370	13800	4934	7200
Yell. NP	1368	12000	3468	6300
Teton	1352	13200	2651	7400
Lincoln	1226	11400	4264	5800
Sheridan	1113	10800	2532	7300
Johnson	1059	13200	4173	9500
Crook	1027	6600	2856	3400
Sweetwa	1020	9700	10478	3800
Natrona	1014	9100	5558	4000
Big Horn	985	13200	3161	9500
Laramie	897	7900	2686	3100
Hot Spgs	875	12500	2022	8300
Converse	843	9300	4285	4900
Washakie	798	9400	2262	5400
Platte	791	7000	2109	2700
Uinta	774	9800	2086	3500
Weston	766	6200	2398	2600
Goshen	679	6100	2235	2000
Campbell	674	6000	4756	2600
Niobrara	560	6100	2614	2600

From these results we can see that size of a county does not account for a lot of the variability in the number of taxa, whereas highest elevation in a county accounts for a good deal of the variability. Walt's attributing Fremont County's high diversity to a wide mix of habitats could not be evaluated with this method. Someday the data may be available to do so.

The high correlation with highest elevation would have been even higher if three counties had been excluded. A scatter diagram of the data shows Crook County with a much higher number of taxa than would be expected based on its highest elevation. This can be attributed to the presence of five major floras at that one location: Rocky Mountain, Great Plains, Great Basin, Eastern Deciduous Forest, and Boreal Forest. On the other side of the line, Big Horn and Hot Springs counties have fewer taxa than expected by their highest elevations. Perhaps this results from much of their highest elevation being relatively inaccessible and thus not thoroughly collected.

The counties with the smallest floras need not be downplayed. As an example, Goshen County harbors at least 22 species that are not known to occur anyplace else in Wyoming. In addition, these counties have much greater floristic diversity than a county of corn fields in Iowa.

The Vascular Flora of the Southern Rocky Mountain Region

By Neil Snow
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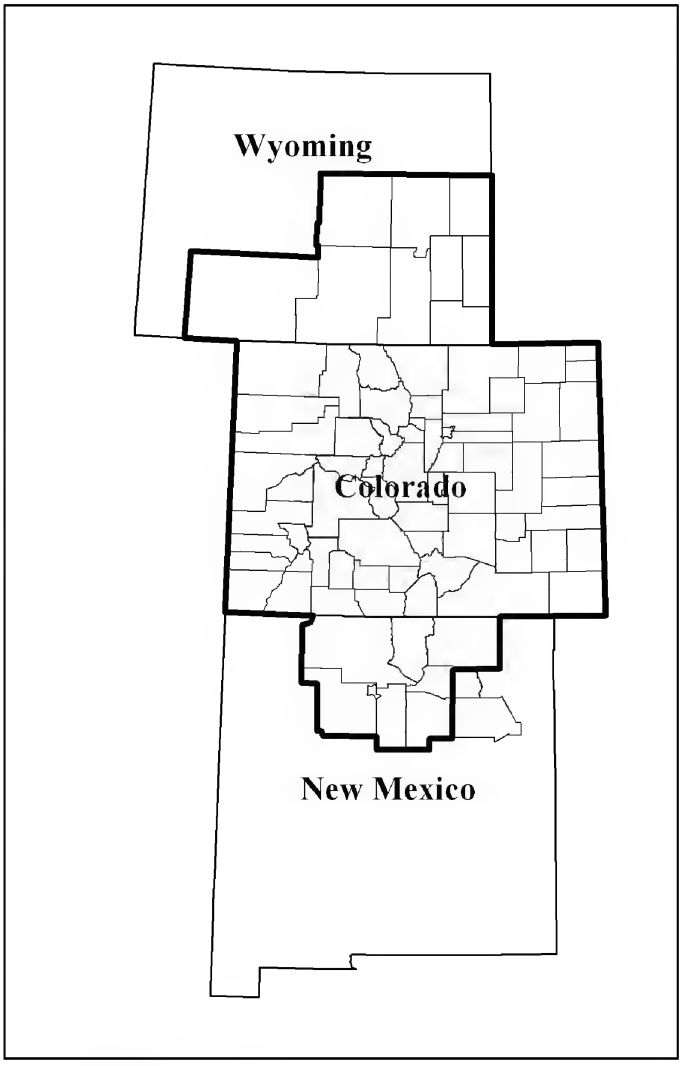
In 2003 four co-operating universities were awarded funding from the National Science Foundation for three years to support the Vascular Flora of the Southern Rocky Mountain Region project (www.southernrockiesflora.org/index.php), or VFSRM. The principal investigators of the project are Drs. Mark Simmons (Colorado State U.), Ron Hartman (U. of Wyoming), Thomas Ranker and Rob Guralnick (both U. Colorado-Boulder), and me (U. Northern Colorado).

As defined for the project, the VFSRM includes most of southern Wyoming, all of Colorado, and several counties in north-central New Mexico (see map). The vast expanse includes extensive areas of mountainous terrain, high altitude basins, canyon and plateau country in western Colorado, and much of the southern half of the High Plains/ shortgrass prairie ecosystem. The VFSRM has two primary components and a smaller third component.

First, specimens from the region will be databased, and the information contained therein will be made available on-line through a federation of databases maintained at CU-Boulder. Updates to the databasing programs at UNC, CSU, and UW are being developed and implemented at CSU. As many readers already know, most areas of the Southern Rockies have been intensively surveyed for floristic diversity in the past two decades, largely through the graduate floristics program at the Rocky Mountain Herbarium led by Ron Hartman. The specimens provide a rich and recent source of data regarding plant distributions. The database will allow users to download in "real time" (updated constantly by the computer system) any and all data associated with taxa from the region, and also enable users to generate distribution maps.

Second, a computerized interactive identification key (IK) is being produced using Lucid software (www.lucidcentral.com) that will be available on-line. Interactive keys can expedite, often dramatically, the identification of unknown plant specimens (Snow 2003). This is particularly true for species-rich genera such as *Carex*, *Astragalus*, *Penstemon*, *Potentilla*, and *Erigeron* sensu lato. The interactive key is being produced primarily at the University of Northern Colorado (www.unco.edu/biology/herbarium) by Jeffrey Brasher, a doctoral candidate, and myself in four phases. The first phase, a key to families, can be downloaded at http://asstudents.unco.edu/students/lucid. The second phase, a key to genera of most families and a detailed treatment of Ericaceae, is nearly ready for posting on the web. The third phase will be a key to all of the roughly 3,285 species known from region. Keys to infraspecific taxa will be in traditional text format within each species. (A checklist of taxa can be downloaded in pdf format (www.unco.edu/biology/SRMIF/SRMIFChecklistFeb04.pdf) or one can search for taxa and synonyms at www.southernrockiesflora.org/checklist . Finally, phase four will be the inclusion of "add-on" information associated with each taxon such as geographical range, associated synonyms, common names, ethnobotanical or other known uses, rare or threatened status, as well as one to several digital images. When completed, the IK will be directly linked to the database, whereby users can easily click onto the associated database link.

The third component of the project is an interactive teaching key, being written by myself, which will have 200 of the most common species from the region and which will also be made available on-line.



Map by Joy Handley

This key will be targeted for use in the secondary levels for educators, but should also be of interest to the public at large.

The VFSRM is an ambitious regional effort and one of the first of its kind in the USA, and is already serving as a model for other regions to emulate. Much work remains to be done. However, upon completion, residents the Southern Rockies will have unparalleled access to current, digitized information on native and naturalized plants in our region. This information will be of considerable value to land use managers, professional botanists worldwide, and native plant enthusiasts.

Columbine populations generally are small. Population size correlates with microsite availability, in

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In addition to NSF, the project has been supported by the Colorado Native Plant Society and the Department of Biological Sciences at UNC. Readers who have outstanding photos of relatively rare taxa are encouraged to consider donating the images for the project (send them to me). You will be given credit as the photographer, and the images will eventually be returned. (Ideally, send them electronically in jpeg or gif formats.)

Laramie Columbine – the Search Continues

By Hollis Marriott

Photo by
Claire Leon
From 2004 fieldtrip

The Laramie columbine, *Aquilegia laramiensis*, grows only in the Laramie Mountains in southeast Wyoming. It is listed as a species of concern by the Forest Service, Bureau of Land Management and WYNDD. The species was first collected in 1895 "at the foot of Laramie Peak" in the northern Laramie Mountains by Aven Nelson. He published a description of the species the next year (Nelson 1896). Nelson made more collections in 1900 and 1901, extending the known range to Ragged Top Mountain in the Laramie Mountains east-northeast of Laramie. By 2002, the species was known from 13 sites; two of these are considered historical without precise location data.

Systematic survey for the Laramie columbine began in 2003, on Forest Service lands in the northern Laramie Mountains (Marriott and Horning 2004). Twenty-one new sites were found, but the overall range remained limited, with most populations in the northern part of the Laramie Mountains. It was recommended that potential habitat on BLM lands south and west of Forest lands be surveyed.

During the 2004 field season, surveys for the Laramie columbine were done on lands managed by the Rawlins Field Office, supported by the BLM and the Wyoming Natural Diversity Database. Twelve new occurrences were found, bringing the total known to 45 (including the two historical records). The known range of the species was expanded, mainly to the southeast, but its overall range remains limited.

keeping with the pattern seen in 2004. Where there are extensive systems of rock outcrops with appropriate microsites, the Laramie columbine occurs as many patches. Some of the outcrops where the columbine was found in 2004 are small, and at lower elevations compared with 2003 survey sites. In these situations, populations are quite small, sometimes with less than twenty above-ground individuals.

New information on habitat was collected in 2004. The elevation range of the species was extended down to 5400 ft (previously the lowest known site was at 6250 ft). As was seen in 2003, the columbine grows on most aspects rather than just northerly as originally reported. All microsites were well shaded in some fashion. The columbine was found on several types of igneous and metamorphic rock, including granite, gneiss and peridotite. As was observed in 2003, it is absent from a reddish coarse-grained type of granite found in parts of the study area.

There now is significantly more information available regarding the distribution and status of *Aquilegia laramiensis* than there was in 2002. However there remain large areas of unsurveyed potential habitat, mainly large complex systems of granite outcrops on lands managed by Medicine Bow National Forest. Most are difficult to access, and survey will take significantly more time compared with work done in 2003 and 2004. There is additional unsurveyed potential habitat on BLM lands west and north of Medicine Bow National Forest. These are managed by the Casper Field Office, and were not included in the 2004 field project. Some sites are thought to have high potential for Laramie columbine, including lands immediately adjacent to the northwest part of Medicine Bow National Forest where the species was documented in 2003.

References cited

Marriott, H. and D. Horning. 2004. Status of Laramie columbine (*Aquilegia laramiensis*) and results of field survey. Unpublished report prepared for the Wyoming Natural Diversity Database, University of Wyoming, and Medicine Bow National Forest, Laramie, WY.

Additions to the Flora of Wyoming

The following two species were discovered in 2004 in southeastern Wyoming by Robert Dorn, and represent additions to the state flora (Dorn 2001). Specimens are deposited at RM.

Small-leaved watercress (onerow yellowcress; *Nasturtium microphyllum* Boenn. ex Reichenb.) GOSHEN COUNTY: Does the Wyoming flora include plants introduced via wagon trains? Among the possible candidates is *Nasturtium microphyllum*, discovered by Robert Dorn at Fort Laramie National Historic Site (Dorn 9846, 9925). It grows submerged in spring-fed habitat among cattails above the Laramie River, near the former camping grounds for wagon tra
in caravans of settlers. It is the second *Nasturtium* species in Wyoming after *N. officinale*. By comparison, *N. microphyllum* has a longer, more slender silique (1.5-2.7 cm long and 1-1.5 mm wide), and somewhat smaller leaflets with lateral ones that usually taper to short petioles.

Engelmann's flatsedge (*Cyperus engelmannii* Steud.) PLATTE COUNTY: Greyrocks Reservoir harbors a new *Cyperus* for Wyoming. *Cyperus engelmannii* was collected by Robert Dorn (10028) on exposed shorelines. It is an annual *Cyperus* closely related to *C. odoratus* (not in Wyoming) and they are treated as distinct in the *Flora of the Great Plains* (Kolstad 1986). It has scales that are remote, i.e. with the scale tips not overlapping the base of the one above. It also has longer scales (2.1-2.8 mm) and generally longer achenes compared to *C. odoratus*. Note: *Cyperus engelmannii* is subsumed under *C. odoratus* in the *Flora of North America* treatment by Tucker et al. (2002) who state that "Numerous segregates have been named, some of which may deserve recognition when the species is studied in detail worldwide."

References cited

Dorn, R. 2001. Vascular Plants of Wyoming, 3rd ed. Mountain West Press, Cheyenne, WY.

Kolstad, O. 1986. Cyperaceaes. *In*: Great Plains Flora Association, eds. Flora of the Great Plains. University Press of Kansas, Lawrence, KS.

Tucker, G.C., B.G. Marcks and J.R. Carter. 2002. *Cyperus*. *In*: Flora of North America Editorial Committee, eds. Flora of North America, Vol. 23. Cyperaceae. Oxford University Press, New York, NY.

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Loss to the Wyoming Botany Community

Wyoming lost a patron saint of botany in the death of Stuart Markow on November 28, 2004 in Laramie. He adamantly refused to take credit in any professional acknowledgements but contributed to the botany community throughout Wyoming and the region, and touched all who knew him in infinite ways.

His death is an unfathomable loss.

If you care to send recollections and stories, we will try to honor him with tributes.

Rocky Mountain Herbarium
Department of Botany, 3165
1000 E. University Ave.
Laramie, WY 82071

WNPS
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Laramie, WY 82073

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Wyoming Native Plant Society

2005 Membership Renewal, Ballot, By-Laws Vote and Field Trip Survey

Membership Renewal [Check the mailing label on this newsletter for the 2-digit value indicating latest year membership was paid.]

Name: _____ _____ $ 7.50 Regular Membership

Address: _____ _____ $15.00 Scholarship-supporting Membership - $7.50 goes to annual scholarship fund)

_____

_____email address (optional)

BALLOT

Please vote for one person for each office:

President	_____	Bonnie Heidel (Laramie)	Secretary/Treasurer	_____	Ann Boelter (Laramie)
	_____	_____		_____	_____
Vice President	_____	VACANT	Board (2-year term)	_____	Mike Evans (Saratoga)
	_____	_____		_____	_____

BY-LAWS VOTE

_____ _____ I approve the proposed By-Laws amendments to Articles 3, 4, 5, 7 and 9 as printed in full on the reverse side.
YES NO

FIELD TRIP SURVEY

Where in Wyoming would you like to explore? Annual field trips of Wyoming Native Plant Society span the far flung corners of the state's flora and landscapes. Half of the counties in the state have NOT been visited. Please vote TWICE – one vote for a destination, and another for a county (differing from the destination).

PLACE VOTE (one vote)

Black Hills _____
Cedar Mountain and Uintah Range _____
Fossil Butte NM/Tufted twinpod _____
Hot Springs State Park/ Owl Cr Mts _____
Sierra Madre (in tandem with Audubon) _____
Wind River endemics _____
Other _____

COUNTY VOTE (one vote)

Bighorn ____ Campbell ____
Laramie ____ Hot Springs ____
Natrona ____ Lincoln ____
Platte ____ Niobrara ____
Sublette ____ Sheridan ____
Weston ____ Uinta ____
County of previous trips _____

Would you be willing to head a fieldtrip planning committee or one of the above? Interest and availability during spring planning are the only prerequisites. _____

PAST WNPS ANNUAL FIELDTRIPS

Date	Location	County
27-Jun-81	Castle Gardens	Fremont
24-Jul-82	Black Hills	Crook
2-Jul-83	South Pass	Fremont
11-Aug-84	Beartooth Plateau	Park
3-Aug-85	Yellowstone National Park	Park
4-Jul-86	Flaming Gorge	Sweetwater
18-Jul-87	Laramie Range	Albany
16-Jul-88	Sierra Madre	Carbon
24-Jun-89	Swamp Lake	Park
21-Jul-90	Bighorn Range	Big Horn, Sheridan
22-Jun-91	Bighorn Canyon	Bighorn
27-Jun-92	Beaver Rim/South Pass	Fremont
19-Jun-93	Black Hills, Devils Tower	Crook
9-Jul-94	Grand Teton National Park	Teton
17-Jun-95	Red Desert	Sweetwater
3-Aug-96	Snowy Range	Albany
26-Jul-97	Ft Laramie/Torrington dunes	Goshen
1-Aug-98	Wind River Range	Sublette
19-Jun-99	Flaming Gorge	Sweetwater
17-Jun-00	Shirley Basin	Carbon
23-Jun-01	Bighorn Range	Johnson, Washakie
14-Jun-02	Heart Mountain, Bald Ridge	Park
31-May-03	Jack Morrow Hills	Sweetwater
19-Jun-04	Laramie Peak vicinity	Converse, Albany

Return this renewal, ballot, By-Laws vote, survey response (any or all parts) by 4 Feb to:
Wyoming Native Plant Society, PO Box 2500, Laramie, WY 82073

?The Wyoming Native Plant Society?
PROPOSED BY-LAWS AMENDMENTS[1]

ARTICLE THREE: MEMBERSHIP
Section 2. Initiation Fees and Dues. The membership may determine by simple majority the amount of initiation fees and dues. Annual individual dues shall be $7.50 for membership, and $15 for scholarship-supporting membership (of which $7.50 is allocated to the scholarship fund). In addition, a life membership category is set at $200 (of which $50 is allocated to the scholarship fund). The membership year will follow the calendar year. All new memberships in the latter half of the membership year will be applied to the following year. Members who fail to pay their dues when they become due shall be notified by the Secretary-Treasurer, and if payment is not made within the next succeeding 6 months, they shall be dropped from the rolls of membership. In addition, members failing to pay their dues at or before the annual meeting shall not be eligible to vote in said meeting.

ARTICLE FOUR: OFFICERS
Section 3. Nominations. A nomination committee of three members shall be appointed by the President by September 30. The committee shall assemble a slate of at least one candidate for each office, posted in an election ballot in the last newsletter of the membership year/fiscal year/term of office. Nominations may be submitted in writing by any member to the Secretary-Treasurer at least two weeks before ballots are printed.

ARTICLE FIVE. MEETINGS.
Section 2. Board of Directors Meetings. Meetings, conference calls and email votes of the Board of Directors may be called by the President or any three members of the Board whenever a need for a Board action arises. Meetings shall be open to the entire membership. All Board actions will be reported in the newsletter.
Section 3. Notice. Reasonable notice (at least two weeks) of any annual or Board of Directors meeting shall be given by personal contact, mail, email, newsletter announcement or telephone to each member at his/her last known address except that in the case of Board of Directors meetings, notification need only be given to members of the Board and such other members of the Society who have requested such notification.

ARTICLE SEVEN: CHECKS AND DEPOSITS.
Section 1. Checks. All checks, drafts, or other orders for the payment of money or other evidences of indebtedness issued in the name of the Society shall be signed by officers of the Society or Board-appointed members delegated with check-signing authority on file at the Bank. All expenditures of $50 or more per item shall first be approved by a majority vote of the Board including Scholarship awards, excluding routine meeting or newsletter expenses.

ARTICLE NINE: AMENDMENT OF THE BY-LAWS.
The membership by simple majority of all members in good standing shall have the power to amend the By-laws of the Society at any meeting or by mail. Amendments proposed for any meeting shall be announced in the notice for that meeting or in advance of the mail vote. Amendments can be acted upon without a meeting in accordance with Article Five, Sections 2 and 3.

If you have made it this far...

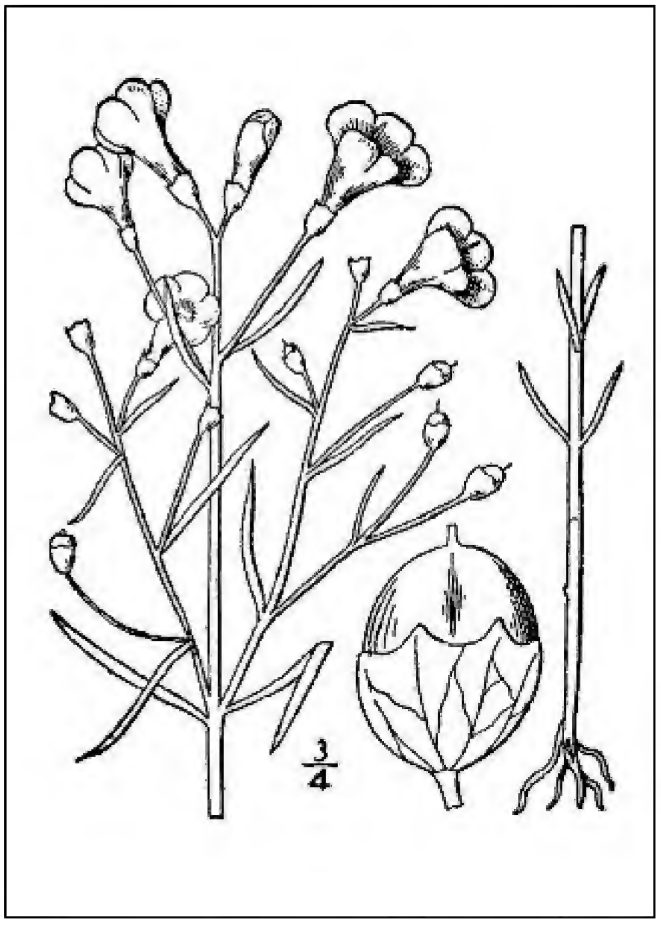
Thank you and Happy New Year! Response is needed by 4 February
from 66% of all members to pass the proposed By-Laws amendments above.

[1] Proposed additions to the By-Laws are underlined. The only revisions to existing text are proposed changes to Articles 2 and 9 that would require responses from 50% of all members rather than 66% of all members in order to pass a membership dues change or a By-Laws amendment.

Holding Down the Fort... and Flora

By Bonnie Heidel

In a history as wild as the Wild West it represents, the Fort Laramie National Historic Site encapsulates Wyoming's history of successive Native Americans cultures, territorial explorations, trading, U.S. military-Indian Wars, pioneer trails, and later settlement. After statehood, in 1890 the Fort Laramie Military Reservation dissolved as a 35,000 acre reservation and was divided into homestead parcels. In 1938, the 214 acres in and around the fort site were made a national monument, and finally the Fort Laramie National Historic Site was designated by Congress in 1960. Currently, the National Park Service administers 832.85 acres at Fort Laramie National Historic Site (FOLA) and has law enforcement responsibility for 340 acres of nearby BLM tracts with shared history.



Agalinis tenuifolia adds brilliance to banks of the Laramie River in Fort Laramie National Historic Site, a species at is western limits in eastern Wyoming.

Illustration from: Britton, N.L., and A. Brown. 1913. *Illustrated flora of the northern states and Canada*. Vol. 3: 301. Courtesy of Kentucky Native Plant Society. Scanned by Omnitek Inc. Usage Guidelines

Each layer of FOLA's early history is intimately linked to its natural history. Thus, in 1993, the management plan of FOLA identified as a goal to "Re-establish and promote native plants and animals that contribute to and create the Park's historic scene..." (USDI 1993). Overarching nationwide National Park Service management guidelines later identified the need to document existing flora and fauna as a key step in meeting this and all other management mandates (USDI 2001). Floristic inventory was also suggested as one of ten management issues or questions that would advance FOLA vegetation management within the larger mandate (Jones and Tebben 2002).

Prior to this time, FOLA had had more than a head-start at floristic inventory – it had a veritable *magnum opus*. Floristic inventory was conducted at FOLA by B.E. Nelson as part of extensive floristic inventory in southeastern Wyoming (Hartman and Nelson 1995). The known FOLA flora was compiled by Walter Fertig (Fertig 2001) to produce a checklist of 177 species. This checklist was compared with the known Goshen County flora as represented by the Atlas of the Flora of Wyoming (Hartman and Nelson 1998). The preliminary comparative work indicated that there could be twice as many species at FOLA as had been previously documented.

In 2003, the National Park Service asked Wyoming Natural Diversity Database to census rare species and check the completeness of floristic documentation. There were five Wyoming species of concern among the reported flora (Fertig 2000) of 177 species. As good fortune would have it, two of Goshen County's most recent settlers were Robert and Jane Dorn. Robert Dorn contributed greatly in collecting "missing" plants at FOLA, including those with early and late phenologies, and that represent the full array of FOLA habitats, families, and parcels of land.

The FOLA flora, originally reported at 177 species, is now known to include 376 species (Heidel 2004), with a large wetland flora befitting its place at the confluence of the Laramie and North Platte rivers. We did NOT find the walnut tree that once grew in Fort Laramie bottoms, but the favorable 2004 growing season did foster flowering of *Nasturtium microphyllum*, an introduced water-cress that was collected by Dorn as a new addition to the Wyoming flora (see the report on new additions to the flora).

Seven Wyoming species of concern are now known, and six are river-dwellers. Channel changes in the meandering Laramie River within the past 50 years may have helped maintain or increase successional habitats for the six rare riparian species. In addition, the known Goshen County flora grew by 23 new county flora additions vouchered in this project (679 species were previously reported for the county; see "Floristic Diversity of Wyoming Counties", by Walter Fertig, in the previous *Castilleja* issue).

The National Park Service faces challenges in presenting each historical facet within its management mandates at Fort Laramie. Fortunately, there is a rich flora to fortify the natural history, ... and a key role for the flora in the future of the Fort.

Table 1. Wyoming plant species of concern at Fort Laramie National Historic Site

Scientific Name	Common Name	Global rank/ State rank
Agalinus tenuifolia var. *parviflora*	Slender False-foxglove	G5T4/S1
Cyperus acuminatus	Sharp-point flatsedge	G5/S1
Cyperus bipartitus	Shining flatsedge	G5/S1
Euphorbia hexagona	Six-angle spurge	G5/S1
Lipocarpha drummondii	Dwarf bulrush	G4G5/S1
Lobelia siphilitica	Great blue lobelia	G5/S1
Sorghastrum nutans	Indian grass	G5/S1

Acknowledgements

This article reflects the work of many, including Robert Dorn, B.E. Nelson, Walter Fertig and all who are associated with the Rocky Mountain Herbarium and Fort Laramie National Historic Site.

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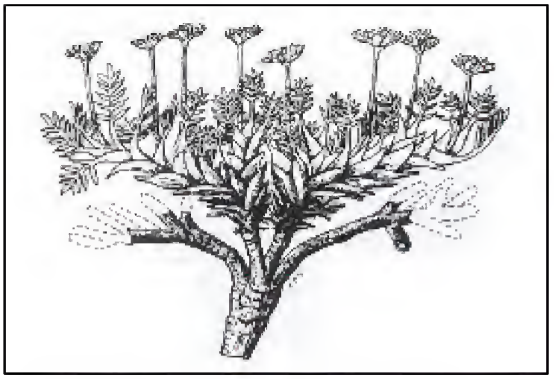

Shoshonea pulvinata. Illustration by Erwin Evert. From: Systematic Botany 7:427-275, 1982.

Botanist's Bookshelf

Alpine Plants of North America - An Encyclopedia of Mountain Flowers From the Rockies to Alaska by Graham Nicholls. 2002. Illustrated. 344 pp. Timber Press: Portland, OR.

Reviewed by Jean Daly

Alpine Plants of North America - an Encyclopedia of Mountain Flowers From the Rockies to Alaska has about 650 species in 54 genera of mostly alpine plants, many of which are found in Wyoming. Although Nicholls intended the book basically for the gardener, traveler and alpine house grower with a discussion of propagation and cultivation information, he also provides a wealth of information for the alpine enthusiast and the botanist who has an interest in the alpine plants.

The main portion of the book is an alphabetical listing by species of alpine plants, under what conditions and where they grow natively, and in addition he includes a check list of common alpine plants arranged by state. There are 495 color photographs of alpine plants in their native habitats as well as in rock gardens and containers. The author, Graham Nicholls, who took many of the photographs himself, is a respected British nurseryman who specializes in growing alpine plants of North America and in visiting them in their native habitats.

He has pictures of many of the alpines in the Big Horn Mountains and around Wyoming and Montana and mentions specifically where the pictures were taken including Hunt Mountain in the Big Horns, and the Pryor Mountains of Montana. He goes into some detail about where the plants can be found and their native habitat devoting more than a page to *Shoshonea pulvinata* a new monotypic genus that Erwin Evert discovered in Wyoming and published the details about in 1986. The book includes some plants that are not in the strictest sense "alpine" species, but share many of the characteristics of their alpine relatives.

This is a beautiful and inspiring book and would make a welcome addition to your library on the native plants whether you are a gardener or not.

Where are we Going??

Plant Monitoring in Wyoming – A Preview

By Bonnie Heidel

Plant trends tell us about changes to populations and vegetation. In many cases they are also the best sources of information we have on future scenarios. Apart from weed monitoring, the monitoring of plant populations is a fledgling pursuit in Wyoming compared to vegetation monitoring or the "forensic" monitoring involved in paleobotany and dendrochronology.

Plant population monitoring is the collection and analysis of repeated observations or measurements to evaluate plant population changes (Elzinga et al. 1998). There are three monitoring levels:

1. The most basic level of monitoring is to determine presence/absence over time.
2. The intermediate level of monitoring is census over time, and
3. The most intensive level of monitoring is demographic monitoring to determine the life history or species biology characteristics that are associated with population change (Menges and Gordon 1996).

Monitoring may be conducted to evaluate baseline conditions, the mechanics of species' life history, and/or progress in meeting management objectives. It may be conducted on monthly, annual, infrequent or event-driven intervals depending on the purpose and plant species. In addition, there are many sample designs and data analyses possible at all three levels.

Botanists do not have monitoring rituals like birders, with their Christmas bird counts and annual breeding bird surveys. Instead, the Wyoming plant species monitoring to date has zeroed in on baseline conditions of Threatened, Endangered, sensitive and other rare plant species. Such data are used increasingly under Endangered Species Act evaluations and in international evaluations under the IUCN.

Information is compiled on which rare species and populations are monitored by the Wyoming Natural Diversity Database (WYNDD) as part of the record maintained for each population. A double-check for completeness is in progress. Each annual monitoring report is entered as a bibliographic reference, and the basic information in it is added to the population (occurrence) record, including:

- The monitoring location
- The monitoring date
- The monitoring personnel
- The monitoring level
- A synopsis of the monitoring results

Where are we headed in maintaining rare plants in Wyoming? Stay tuned! Monitoring highlights will appear in future newsletters.

References cited:

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Announcing:: Measuring and Monitoring of Plant Populations and Vegetation

The BLM National Training Center is conducting a national training course, Measuring and Monitoring of Plant Populations, in Lander on June 16-22, 2005; the first time it will be offered in Wyoming. If you are interested, register at the following internet address below for Course No. 1730-05. http://oslearn.ntc.blm.gov/itdc.nsf/
The cost is $600 for non-BLM enrollment (includes the cost of the book: Elzinga et al. 1998).

Course objectives:

- Determine how to set monitoring priorities
- Differentiate between management objectives and monitoring objectives
- Analyze the primary decisions associated with sampling designs
- Conduct vegetation measurements (frequency, cover, density, biomass, vigor)
- Choose the appropriate statistical analysis techniques and run calculations
- Choose and set up data recording systems

Lost your sense of direction?
-- Check the Internet

By George Jones

You've checked your topo map for the magnetic declination, adjusted your compass, and you're ready to go. Right? WRONG! Note the date on your map. That's the year in which the declination reading was correct, but declination changes. Use that declination to set your compass today, and you'll never make it home. You're finished. Might as well sit down right there and review your life.

This problem has bothered all of us for as long as we've known north. Well, be bothered no longer. Here's a web site that will calculate the present declination for you. All you need is the latitude and longitude of the place. And the web site even helps you get those.

Here, at last, is a REAL reason for the world-wide web.

The National (USA) Geophysical Data Center has seven magnetic parameters and their rates of secular change. Posted at: http://www.ngdc.noaa.gov/cgi-bin/seg/gmag/fldsnth1.pl

Wyoming Native Plant Society
P.O. Box 2500
Laramie, WY 82073

The Wyoming Native Plant Society, established in 1981, is a non-profit organization dedicated to encouraging the appreciation and conservation of the native flora and plant communities of Wyoming. The Society promotes education and research on native plants of the state through its newsletter, field trips, and annual student scholarship award. Membership is open to individuals, families, or organizations with an interest in Wyoming's flora. Members receive *Castilleja*, the Society's quarterly newsletter, and may take part in all of the Society's programs and projects, including the annual meeting/field trip held each summer. Dues are $7.50 annually. To join or renew, return this form to:

Wyoming Native Plant Society
P.O. Box 2500
Laramie, WY 82073

Name: _____

Address: _____

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___ $7.50 Regular Membership
___ $15.00 Scholarship Supporting Member
($7.50 goes to the annual scholarship fund)